

WHAT IS CLAIMED IS:

1. An assembly for enabling separation of a fluid sample into a formed phase
5 with a relatively high density and a liquid phase with a relatively low density, said
assembly comprising:

a tube having a closed bottom, an open top and a cylindrical sidewall extending
therebetween;

a closure sealingly engaged with said open top of said tube; and

10 a separator comprising a deformable bellows having an upper end and a lower end,
portions of said bellows between said upper and lower ends having an unbiased
shape for sealing engagement with said cylindrical sidewall of said tube, a ballast
15 securely mounted in proximity to said lower end of said bellows, said ballast being
dimensioned to be spaced inwardly from said cylindrical sidewall of said tube and
having a density greater than said density of said liquid phase of said fluid sample,
and a float engageable with portions of said bellows in proximity to said upper end
20 of said bellows, said float having a density less than said density of said formed
phase of said fluid sample and less than said density of said formed phase of said
fluid sample, whereby centrifugal forces applied to said assembly enable
elongation of said bellows and movement of said separator in said tube to a
location between said formed and liquid phases of said fluid sample.

25 2. The assembly of Claim 1, wherein the separator is substantially hollow.

3. The assembly of Claim 1, wherein said bellows includes a toroidal sealing section intermediate said upper and lower ends thereof, said toroidal sealing section, in an unbiased condition of said bellows, being engageable with said cylindrical sidewall of said tube.

5 4. The assembly of Claim 3, wherein said ballast is substantially tubular and is securely engaged around portions of bellows adjacent the lower end of said bellows.

10 5. The assembly of Claim 3, wherein said ballast is substantially tubular and is securely engaged around portions of bellows adjacent the lower end of said bellows.

15 6. The assembly of Claim 5, wherein said bellows is substantially hollow and has an inwardly directed annular bead in proximity to said upper end of said bellows, said float having an annular groove engageable with said annular bead of said bellows, whereby buoyancy of said float urges said float toward said top of said tube for elongating said toroidal sealing section of said bellows.

20 7. The assembly of Claim 1, wherein said separator is releasably engaged with said closure, said separator being disengageable from said closure in response to centrifugal loads on said assembly.

8. The assembly of Claim 7, wherein the closure includes a centrally disposed needle pierceable septum for enabling placement of fluid in said tube.

25 9. The assembly of Claim 1, wherein said closure includes a lower end engageable in said open top of said tube, said lower end of said closure including a recess extending upwardly therein, a plurality of resiliently deflectable arc sections formed around said recess at said lower end of said closure, said bellows including a closure

mounting section adjacent said upper end of said bellows, said closure mounting section having an inwardly extending groove engageable with resiliently deflectable arcs of said closure for releasably holding said bellows of said separator with said closure.

5 10. A separator for use with a blood collection tube to enable separation of blood into a formed phase with a relatively high density and a liquid phase with a relatively low density, said separator assembly comprising:

10 a deformable bellows having an upper end and a lower end, portions of said bellows between said upper and lower ends having an unbiased shape for sealing engagement within said tube;

15 a ballast securely mounted to said bellows in proximity to said lower end of said bellows, said ballast having cross-sectional dimensions smaller than said tube for free movement of said ballast in said tube, said ballast having a density greater than said density of said liquid phase of said blood; and

20 a float engageable with portions of said bellows in proximity to said upper end of said bellows, said float having a density less than said density of said liquid phase of said blood and less than said density of said formed phase of said blood, whereby centrifugal forces applied to said assembly enable elongation of said bellows and movement of said separator assembly in said tube to a location between said formed and liquid phases of said blood.

25 11. The assembly of Claim 10, wherein said ballast is substantially tubular and is securely engaged around portions of bellows adjacent the lower end of said bellows.

12. The assembly of Claim 11, wherein said ballast is substantially tubular and is securely engaged around portions of bellows adjacent the lower end of said bellows.

13. The assembly of Claim 12, wherein said bellows is substantially hollow and has an inwardly directed annular bead in proximity to said upper end of said bellows, said float having an annular groove engageable with said annular bead of said bellows, whereby buoyancy of said float urges said float toward said top of said tube for elongating said toroidal sealing section of said bellows.

14. The assembly of Claim 10, wherein said bellows includes an engaging structure in proximity to said upper end of said bellows, said float being configured for engagement with said engaging structure on said bellows.

15. The assembly of Claim 14, wherein said ballast includes a lower end, said lower end of said ballast including structure for preventing downward movement of said float relative to said ballast but for permitting upward movement of said float relative to said ballast.